SEA ICE OUTLOOK

2016 July Report (using June data)

Core Requirements for Pan-Arctic Contributions:

1. Name of Contributor: Yizhe Zhan

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3. Do you want your contribution to be included in subsequent reports in the 2016 season: Yes

4. "Executive summary" of your Outlook contribution:
   Our statistical model is based purely on the June top-of-atmosphere reflected solar radiation (RSR). It works because the main contribution to the Pan-Arctic June RSR anomaly is the surface albedo variation, especially for the region consisting of the Beaufort Sea and E. Siberian Sea (BESS). Compared to June 2015, MISR shows a significant decrease in RSR over both the south Beaufort Sea and E. Siberian Sea, but an increase in the west Laptev Sea and Chukchi Sea. The area-weighted Pan-Arctic mean June RSR 2016 is lower than that in 2015, but follows the 2002-2015 trend with a slightly positive anomaly. Thus, we estimated the September sea-ice extent 2016 follows its 2002-2015 trend with a slightly positive anomaly.

5. Type of Outlook method: statistical

6. Dataset of initial Sea Ice Concentration (SIC) used: Not relevant

7. Dataset of initial Sea Ice Thickness (SIT) used: Not relevant

8. If you use a dynamical model, please specify: Not relevant

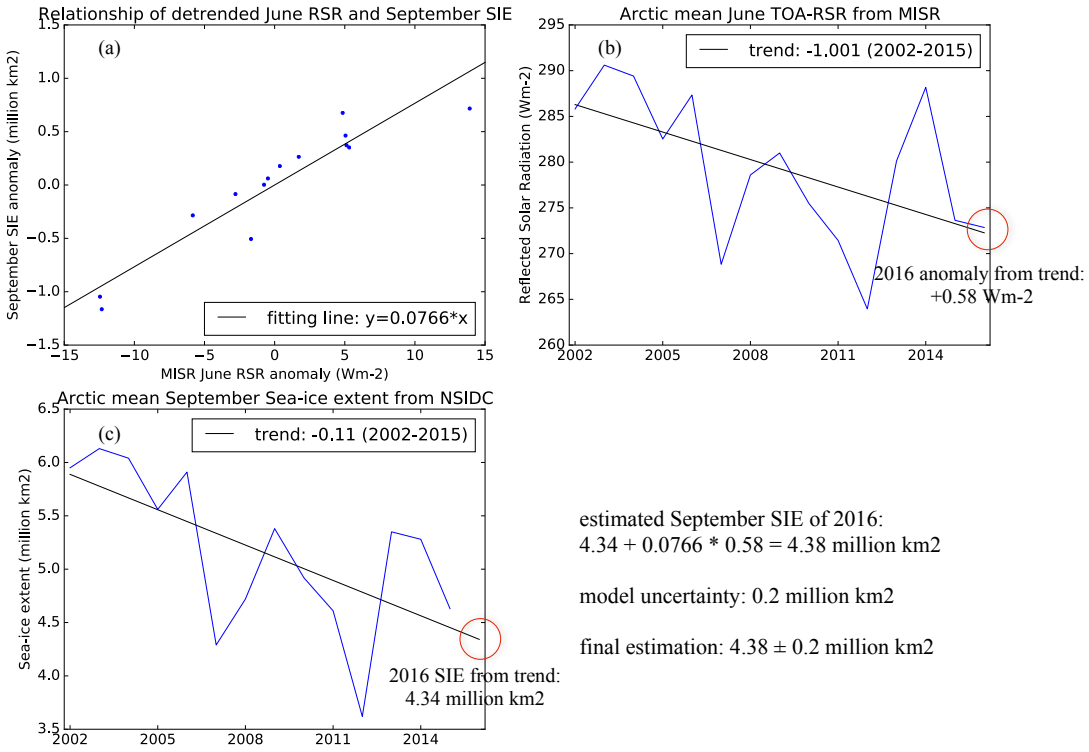
9. Prediction of September pan-Arctic extent: 4.38 ± 0.2 million km^2

10. Prediction of the week that the minimum daily extent will occur: Not predicted

11. Short explanation of Outlook method:
    The statistical prediction is based on the significant 3-month lag correlation between June top-of-atmosphere reflected solar radiation (RSR) and September sea ice extent (SIE), which is verified by hindcast models of satellite observations (CERES and MISR) and the forecast model of the reanalysis dataset (MERRA-2). The significant correlation between the two variables reached up to 0.94 using the detrended MISR dataset from 2002 onwards and 0.81 for the detrended MERRA-2 dataset from 1990 onwards. It should be noted that the exclusion of 2000 and 2001 for CERES and MISR is due to a data outage for half of June 2001.

    Since MISR already released its June RSR 2016 dataset, we used its hindcast model, which is established from the detrended June RSR and September SIE data (2002-2015, Fig. a). The June RSR 2016 anomaly is calculated by subtracting it from the 2002-2015 RSR trend

(Fig. b). This RSR anomaly is then applied to the model to estimate the September SIE anomaly of this year. Lastly, our final estimation is made by adding the anomaly to the September SIE from the 2002-2015 trend (Fig. c).



12. Uncertainty: 0.2 million km^2.
    The resulting uncertainty is the prediction error of the MISR hindcast model for the years 2002 to 2015. It is the standard deviation of the differences between modeled and observed September SIE.